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PlayWrite: End-User Adaptable Games to Support Adolescent Mental Health

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Abstract

Adaptability to the needs of end-users has been identified as a key requirement for technologies designed to support mental health interventions. The PlayWrite system allows end users - mental healthcare professionals - to create and adapt therapeutic 3D computer games, which can then be used to support adolescent interventions. PlayWrite has enabled the creation of games that implement a range of theoretical approaches to mental health interventions and target a broad range of disorders. Here we discuss the initial findings regarding the design, clinical evaluations and adaptation strategies used in PlayWrite.

Keywords

Mental health, adaptable design, computer gaming

ACM Classification Keywords

H.5.m [Information Interfaces and Presentation]:
Miscellaneous – User-centred design, mental health.

General Terms

Design, Human Factors

Introduction

The projections of the Global Burden of Disease Study indicate that in 2030 mental health difficulties will be the leading worldwide cause of disability [1]. The human and economic costs of this trend will be substantial.

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Addressing the challenges of providing effective and accessible mental healthcare (MHC) will require a concerted effort by professionals across a range of disciplines. A growing body of evidence suggests that it is likely – indeed necessary – that technology will play a significant role in helping to address these challenges [2, 3]. The design of technologies to support mental health interventions has recently become the subject of HCI research. Alongside designing new, exploratory systems, research has focused on understanding the unique challenges and requirements of designing in the MHC domain [2]. Adaptability to the needs of end users has been identified as a significant requirement for new technologies [2, 4].

Adaptability to the needs of end-users

In designing technologies to support mental health interventions two key user groups must be considered: therapists and the clients with whom they work. Given the durations typically involved in designing and evaluating new technologies for MHC settings, it is desirable that, once proven effective, systems can be used by a broad variety of therapists, working with a broad variety of clients. This is not a trivial undertaking. Therapists, particularly in public health services, are required to work with clients from a broad variety of socio-cultural backgrounds, experiencing a range of disorders of varying severities. Furthermore, teams of therapists often have different theoretical backgrounds and adopt a variety of eclectic approaches to working with clients.

Evaluations of the therapeutic 3D computer game Personal Investigator (PI) highlighted the limitations of fixed systems in MHC settings [5, 6]. Used with appropriate clients PI was found to deliver benefits

including helping to establish and maintain effective client-therapist relationships and assisting in improving client engagement. However specific socio-cultural features, such as the appearance of characters and the accent and language used in game voiceovers, were found to limit the suitability and even make PI unusable with many adolescent clients. Similarly the use of a specific theoretical approach to MHC limited the suitability of PI to a broad range of therapists.

For technologies to be of practical use in a broad range of MHC settings, [2] suggests that systems should ideally be adaptable to:

- A broad range of theoretical models
- A broad range of mental health disorders
- The differing needs of various socio-cultural groups
- The specific needs of individual clients

Designing PlayWrite

PlayWrite was designed by an interdisciplinary group including both HCI and MHC researchers. It builds on previous research demonstrating the potential of computer games in adolescent mental health interventions [6, 7]. In developing PlayWrite the overall aim was to create a system that allows one key group of end-users - MHC professionals – to play an active role in creating or adapting therapeutic games, which can then be used with the other key end-user group, adolescents. Alongside the adaptability goals outlined above, several general aims were established for PlayWrite:

1. MHC professionals with limited technical experience must be able to create new games or adapt existing games.

2. The system must be capable of creating games that can be used in real world clinical settings.

While addressing the first point involved development of a usable system, addressing the second was essential to validating both the approach to adaptability applied in PlayWrite and the value of the system. In order to be deemed successful, and to be relevant to practicing therapists, PlayWrite needed to produce games suitable for evaluation in clinical settings.

Forms of Adaptation

The choice of appropriate forms of adaptation to make available to MHC professionals was a critical decision in the design of PlayWrite. Prior to developing PlayWrite interviews were conducted and surveys were completed by 32 MHC professionals. These requirements gathering exercises highlighted the limited technical experience of this user group. While most had experience of using Internet browsers, email clients and Microsoft Office applications, very few had experience with more specialist computer programs – such as programming environments – and most expressed limited confidence in their ability to learn to use new software. Few were regular players of computer games and none had prior experience of designing computer games.

Given this limited technical experience, it was decided that PlayWrite would focus on enabling MHC professionals to make content oriented adaptations. The system provides a fixed game template, but allows MHC professionals to adapt the therapeutic content delivered through this template. This approach allowed the design team to focus on developing an interactive system – in this case a flexible computer game – which targets broad therapeutic objectives, e.g. helping to

establish client-therapist relationships and improving client engagement. It was envisioned that MHC professionals would then adapt the content of games to target more specific aims, e.g. implementing specific theoretical approaches, targeting specific disorders and meeting the needs of different socio-cultural groups or individual clients.

PlayWrite

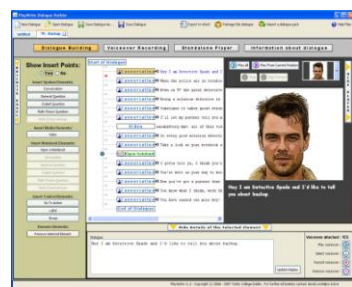
Games created with PlayWrite are primarily character driven, being based around a series of conversations with characters that players meet while exploring the game environment. Fig.1 shows an overview of PlayWrite, which consists of two groups of applications:

1. Applications which allow MHC professionals to create and adapt the content delivered in games.
2. Games which deliver this content in adolescent mental health interventions.

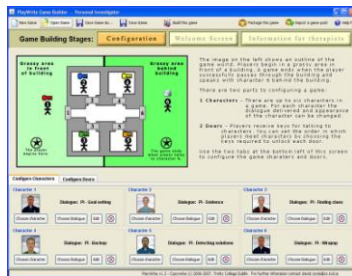
Game creation applications were specifically designed to meet the needs of MHC professionals. For example, the ability to engage clients in therapeutic dialogue is a fundamental skill required of all MHC professionals. PlayWrite builds on this skill, by enabling the creation of dialogue based content. In contrast PlayWrite games focus on delivering content in a manner suitable to adolescents experiencing mental health difficulties and appropriate to the aims of interventions. The game template used in PlayWrite is based on the game world previously used in PI.

The Dialogue Builder

The PlayWrite Dialogue Builder, fig.1(a), allows MHC professionals to create the interactive dialogues which provide the therapeutic content for games. Alongside general conversation, dialogues can incorporate



(a) A screenshot of the Dialogue Builder



(b) A screenshot of the Game Builder



(c) A screenshot from a PlayWrite game

informal and formal psychological questionnaires, in both spoken and written form. Video content - e.g. peer stories delivered within games - can also be integrated into dialogues. The Dialogue Builder supports the creation of branching dialogues and includes interfaces to record voiceovers for dialogues.

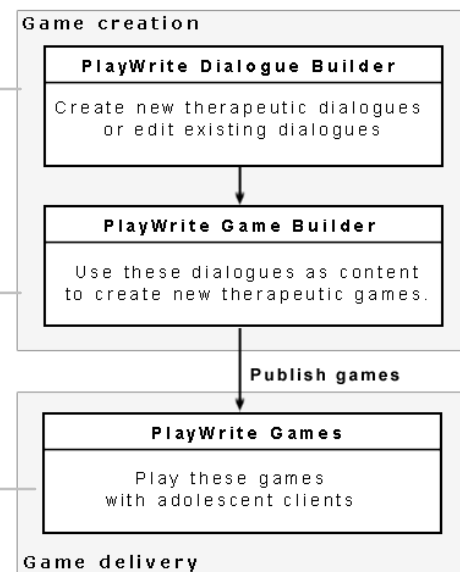


figure 1. an overview of the PlayWrite system

The Game Builder

The Game Builder, fig.1(b), allows users to create new games or edit existing games. New games are created by attaching dialogues to characters in the game template. Alongside choosing the dialogue delivered by each character, users can choose the appearance of characters and configure the order in which players will meet characters, thereby controlling the overall structure of therapeutic content.

PlayWrite Games

When games are published using the Game Builder, all the resources required to run the game are created and a link to start the game is created. Games are designed for use in clinical sessions involving one therapist and one client. In-game dialogues help to provide a context for more detailed conversations between therapists and clients. Fig.1(c) shows a screenshot from a game.

Evaluations of PlayWrite

To date 55 MHC professionals from 18 different mental health services have participated in the evaluation of PlayWrite. Evaluations have taken place in several distinct phases.

Preliminary evaluations

Preliminary evaluations of PlayWrite focused on system usability and on ensuring that the content development applications could be used effectively by therapists. At intervals during an iterative design process formal usability evaluations were conducted. Therapists were asked to complete specific tasks with the applications. An adapted version of the System Usability Scale (SUS) was used to track usability. Preliminary evaluations continued until participating therapists expressed high levels of satisfaction with the system and high levels of confidence in their ability to create games and content. Table 1 shows the responses of ten therapists to questions regarding the usefulness of the Dialogue Builder in an early usability evaluation. On a SUS scoring scale of 0-100 the Dialogue Builder received a mean score of 85.0 in this evaluation. This score indicated that the system is usable by the target end-users and that participants experienced a high degree of user satisfaction.

| Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------------|---------|----------|-------------------|
| The system takes advantage of existing skills of mental health care professionals. | | | | |
| T2 T6 T10 | T1 T3 T4 T5 T7 T8 T9 | | | |
| Dialogues built using this system could be useful in mental health interventions. | | | | |
| T2 T4 T5 T6 T9 T10 | T1 T3 T7 T8 | | | |
| The system is flexible enough to implement a wide range of therapeutic conversations and questionnaires. | | | | |
| T1 T2 T3 T4 T6 T7 T9 T10 | T5, T8, | | | |

Table 1 – Therapists' (T1-T10) responses to statements on the usefulness of PlayWrite.

Games created with PlayWrite

Having completed preliminary evaluations, PlayWrite was made available to participating MHC professionals for a period of 4 months. During this time 5 half-day game building workshops were held. Each workshop was attended by 6-8 therapists, with no overlap in participants. Workshops were supplemented by a series of one-to-one meetings. During this time, alongside a reimplementation of PI, MHC professionals completed 10 new games using PlayWrite, table 2.

Clinical evaluations

At the point of writing several of the games created with PlayWrite have undergone or are currently undergoing clinical evaluations. For example, a re-implemented version of PI, created using PlayWrite has undergone a multi-site clinical evaluation, in which 9 MHC professionals have used the game with 22 adolescent clients. The results of this evaluation have been reported in [6]. Another game, gNatenborough's Island, applies Cognitive Behavioural Therapy and is designed to support a 6 week intervention for

adolescents experiencing depression and anxiety. Formal clinical evaluations are currently ongoing. Multiple baseline scores have been gathered for each adolescent using the game and standardised metrics for anxiety and depression are being collected throughout the 6 week interventions. This will be supported by interviews with therapists and adolescents. Evaluations began in April 2009 and will run until May 2010.

| Game | Therapeutic approach | Issue addressed |
|------------------------|-----------------------|----------------------|
| Personal Investigator | Solution Focused | Non-specific |
| gNatenborough's Island | Cognitive Behavioural | Depression & anxiety |
| Temper Quest | Narrative Therapy | Anger management |
| Beating Bullying | Non-specific | Bullying |
| My Story | Eclectic - Narrative | Non-specific |
| Trail Blazers | Cognitive Behavioural | Anxiety |
| My World | Person Centred | Life Story Work |
| The Identity Game | Narrative | Identity Issues |
| The Islands Game | Non-specific | Non-specific |
| Fitting In | Person Centred | Residential care |
| Anger Detective | Cognitive Behavioural | Anger management |

Table 2: games created with PlayWrite

Feedback from MHC professionals

MHC professionals have expressed largely positive opinions of PlayWrite. Ease of use and flexibility were the two most frequently identified positive aspects of the system. Comments included: "*You can personalise details of game and tailor it so well – I found the game building system extremely user friendly.*"

Negative feedback and suggestions for improvements often focused on the need for improved graphics and a large range of game templates. Observations of system use also revealed that MHC professionals' expectations

were strongly influenced by their experience of word processing applications. For example, the lack of standard keyboard short cut functions in the Dialogue Builder frustrated several participants.

Discussion and future work

The PlayWrite system has successfully demonstrated an ability to meet the adaptability goals identified in [2]. The games listed in table 2 implement a range of theoretical approaches to MHC and address a broad variety of specific disorders. Several games also target specific demographic groups, e.g. My World is targeted at adolescents living in residential care. MHC professionals have also demonstrated an ability to adapt games to meet the needs of individual clients.

PlayWrite achieved its adaptability goals by providing a content delivery template, in this case a computer game, and enabling end-users with limited technical experience to focus on content oriented adaptations. This approach allowed the design team to focus on developing an interactive system which targets broad therapeutic objectives such as improving client engagement. MHC professionals could then draw on their existing domain knowledge to tailor systems to the needs of specific interventions. The games created with PlayWrite reflect the areas of expertise and client needs of participating MHC professionals. In this way the system has provided a sustainable approach to the creation of games which can be used in real world clinical settings and which meet the needs of a broad range of therapists and clients. Providing a flexible system has encouraged MHC professionals to become actively involved in considering effective strategies for developing therapeutic games. For example: *"I'd have to give it more thought. Would I need to 'create' a programme for the different disorders*

e.g. one for eating disorders, one for depression, one for behaviour problems; or would I use it to 'create' a very general package?" Alongside considering such issues, MHC professionals creating games with PlayWrite have generated large amounts of feedback which can be acted upon in future iterations of the system. The system has now reached a point at which clinical evaluations and system development are proceeding in parallel and complement one another. Ongoing design and evaluations of a range of games will help in identifying and refining the features which influence the effectiveness of games with specific user groups.

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